BOMBARDIER AEROSPACE PROCESS SPECIFICATION

BAPS 136-120

REV. C

POLISHING OF ALUMINIUM ALLOY PARTS

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REVISION HISTORY

REV.	DATE	eBCR#	PAGES AFFECTED
--	2010-05-17	eBCR#5156	All
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Comments:

- New BAPS format
- Replacement of obsolete products
- Section 7.1.1 added sanding limitations
- Added exposed core check to the acceptance of Technique Sheets Section 8.2
- Added exposed core check to Part by Part control Section 9.1.1.4.

(Ref.: eBCR #22225)

DISPOSITION OF STOCK:

MATERIALS: ***Use***
PARTS PROCESSED: ***Use as is***

POLISHING OF ALUMINIUM ALLOY PARTS

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LIST OF FIGURES

POLISHING OF ALUMINIUM ALLOY PARTS

1 SCOPE

This specification establishes the requirements, materials and procedures to be used in the process control of the polishing of aluminum alloy parts.

BAEPM-001 supplements this specification regarding request for approval, audit prerequisites, facility approval, personnel training and certification requirements.

Processors must be qualified and approved in accordance with BAEPM-001, and listed in the Bombardier Approved Supplier List (ASL) prior to processing parts per this specification.

In the case of conflict between the requirements of this specification and those of the applicable Engineering Drawing, the Engineering Drawing takes precedence.

1.1 CLASSIFICATION

The process qualified to this specification must be classified using the following criteria:

- Type I Finish: a matt to semi-matt finish.
- Type II Finish: a reflective/bright finish.

When no Type is specified, polishing must be according to Type II Finish.

2 APPLICABLE DOCUMENTS

Except where a specific issue is indicated, the issue of the following documents in effect at the time of manufacture forms a part of this specification to the extent indicated herein.

2.1 BOMBARDIER AEROSPACE DOCUMENTS

BT0213-01	Request for Deviation Form

2.1.1 Bombardier Aerospace Specifications

BAPS 168-013	Hardness and Electrical Conductivity Testing of Metals
BAPS 180-009	Manual Solvent Cleaning
BAPS 180-032	Acid Cleaning and Deoxidizing Aluminum Alloys
BAERD GEN-018	Engineering Requirements for Laboratories

BATS 3211	Method for Measuring Surface Roughness
BATS 5078	Detection of Exposed Core Material on Scratched Clad

2.1.2 Bombardier Aerospace Manuals

BAEMM-001	Bombardier Aerospace Engineering Materials Manual
BAEPM-001	Bombardier Aerospace Engineering Process Manual

3 GLOSSARY

3.1 DEFINITIONS

Mechanical Polishing:	Polishing operation performed with the aid of machinery or power tool, automatic, robotic or manually operated.
Manual Polishing:	Polishing operation performed strictly by hand without the aid of machinery or power tool.

4 FACILITIES AND EQUIPMENT

Facilities and equipment involved in processing according to this specification must be approved per BAEPM-001.

4.1 FACILITIES

No special facility requirement applies.

4.2 EQUIPMENT

Any mechanical polisher/buffer and polishing pads, which can satisfy the process requirements of this specification are acceptable.

5 HEALTH AND SAFETY

Some of the materials used in this specification may be toxic, flammable and/or irritating to the skin.

At Bombardier, consult Health, Safety and Environment Department for specific handling precautions.

Outside Bombardier, the user is solely responsible to consult with the appropriate health and safety authority for specific requirements related to facilities, equipment, ventilation and handling precautions.

6 MATERIALS

6.1 AIRCRAFT AND PROCESS MATERIALS

Not applicable.

6.2 MISCELLANEOUS MATERIALS

Materials listed in this section must meet only those requirements stated specifically against them in this section. BAEMM-001 is not applicable

- Aluminum oxide abrasive paper (CAMI grit 400, 600 or finer)	Open Source
- AP-500	Rolite Company
- Bonderite C-AK 5948-DPM Aero Alkaline Cleaner	Henkel
- Bonderite C-AK Jet E Aero	Henkel
- Flannel cloth	Open Source
- Green Chrome Rouge Compound	Maverick Abrasives
- Lint free cloths	Open Source
- Liquid hand soap (regular/household non-abrasive)	Open Source
- NuShine IIG6	Nuvite Chemical Compounds
- NuShine IIS	Nuvite Chemical Compounds
- Rymplecloth #301 Cloth	Open Source
- Supra 90 Aircraft Metal Polish	Rolite Company
- Tripoli T-2 Compound	Maverick Abrasives
- Very Fine Grit Scotch-Brite abrasive pads	3M
- Wool Pad/Bonnet	Open Source

7 PROCESS

Processing must be performed in strict accordance with this specification. Departures may only occur when a Request for Deviation using form BT0213-01 has been formally approved by Bombardier.

7.1 GENERAL REQUIREMENTS

Mechanical polishing of parts with thicknesses of 0.032 inch or less is prohibited.

Polishing of parts must be done parallel to the grain direction.

7.1.1 Preparation of Parts

Prior to polishing, all parts must be clean and free from dirt, grease, oil, lubricant, primer, paint, ink markings of other contaminant. If necessary, the part shall be solvent cleaned in accordance with BAPS 180-009.

Polishing of parts which have been heat treated may be difficult unless the parts are deoxidized before polishing. When required, deoxidizing must be carried out in accordance with BAPS 180-032.

It is permissible to sand the surface using aluminum oxide abrasive paper (400 grit or finer on bare aluminum alloys and 600 grit or finer on clad aluminum alloys) to obtain a uniform surface prior to polishing with the following restrictions:

- The sanding must not affect the Engineering Drawing requirements for dimensional tolerances and surface roughness.
- On clad parts:
    - Sanding is not permitted on non-anodized parts
    - Only manual sanding is permitted on curved surfaces (radius less than 40 inches)
- The procedure must be documented and approved in a Technique Sheet per Section 8.

7.1.2 Polishing - TYPE I FINISH

To obtain a uniform matt to semi-matt finish (Type I Finish), polishing of the part must be performed using the one of the following methods:

- Mechanical polishing using polisher/buffer and very fine grit Scotch-Brite abrasive pads.
- Hand polishing using very fine grit Scotch-Brite abrasive pads.

It is permissible to polish dry or wet using water or a dilute hand soap/water solution.

The part must be cleaned with water spray rinse and/or water wetted lint free cloths.

7.1.3 Polishing - TYPE II FINISH

To obtain a reflective/bright finish (Type II Finish), polishing of the part must be performed per the approved Technique Sheet of Section 8.

Typically, steps would follow a gradual polishing progression sequence.

1. If required, mechanical polishing using polisher/buffer, recommended polishing pads and Tripoli T-2 and/or Green Chrome Rouge compounds.
2. Mechanical polishing using polisher/buffer, wool pad/bonnet and NuShine IIG6, or hand polishing using Rymplecloth #301 cloth or flannel cloth and NuShine IIG6
3. Final polishing using polisher/buffer, wool pad/bonnet (Mechanical) or Rymplecloth #301 cloth or flannel cloth (Hand Polishing) with either NuShine IIS, AP-500 or Supra 90 compounds.

Polish residues must be removed by solvent cleaning in accordance with BAPS 180-009 using Rymplecloth #301 cloth. Wiping must be done parallel to the grain direction.

Already polished surfaces should be refreshed using only step 3.

7.1.4 Cleaning Before Coating Application

Final cleaning of detail parts prior to application of any temporary or permanent protective coating must be accomplished using a solution containing 1 part by volume Bonderite C-AK Jet E Aero (or Bonderite C-AK 5948-DPM) in 20 parts water. Remove the cleaning solution by rinsing with water.

Check for water-break free surface. If required, repeat solvent cleaning per BAPS 180-009 using Rymplecloth #301 cloth, followed by application of the Bonderite C-AK Jet E Aero solution (or Bonderite C-AK 5948-DPM) and rinsing until a water-break free surface is obtained.

8 REPRODUCIBILITY CONTROL

Prior to production, the process must be developed to meet the requirements of this specification. Process parameters must be documented in the form of a Technique Sheet or Manufacturing Instruction(s).

The process control conditions required in Section 9 must be reflected in the Technique Sheet or Manufacturing Instructions.

All Technique Sheets or Manufacturing Instructions require approval by Quality. Approval from BAMPE is only necessary when requested by BAMPE.

Once approved, the Technique Sheet or Manufacturing Instructions must not be changed in any way, without re-approval.

8.1 TECHNIQUE SHEET REQUIREMENTS

A technique sheet is required for each polishing procedure used on parts.

As a minimum, a Technique Sheet must contain the following information:

- Type of finish: Type I or Type II.
- Type of aluminum alloy and surface finish: alloy, bare or clad.
- Type of surface treatment before polishing: anodized, conversion coating, none.
- Sanding: none, manual, mechanical, grit size
- Type of polishing: manual or mechanical.
- Equipment and settings (RPM. etc.) for mechanical polishing.
- Polishing compounds.
- Polishing sequence: description of each steps.

8.2 ACCEPTANCE OF TECHNIQUE SHEET

When the Technique Sheet of a given polishing procedure is approved by Quality, the first-off production part must be polished according to the Technique Sheet.

Quality must examine the first-off production part and evaluate all of the requirements of Section 10.

In addition, for mechanical polishing procedure and/or where abrasive sanding is used, thickness and electrical conductivity mapping of the first-off production part (or test panel similar to production part) must be performed as follows:

- Thickness and electrical conductivity measurements must be taken and recorded before it is polished. A minimum of 50 locations must be recorded on a surface area of 100 $inch^2$.
- Upon completion of the polishing operation, thickness and electrical conductivity measurements must be taken and recorded again for each location previously inspected.

The thickness measurement must not vary more than ±0.001 inch . The electrical conductivity measurement must not vary by more than ±1 percentage point.

- In addition, the 50 locations must be inspected for exposed core per BATS 5078.
- The equipment used for measuring thickness must have an accuracy of ±0.0005 inch.
- Electrical conductivity testing must be per BAPS 168-013.

Thickness, electrical conductivity and exposed core mapping results must be documented in the Technique Sheet.

9 PROCESS CONTROL

Quality must ensure that all requirements of this specification and applicable approved deviations are met.

9.1 PROCESS CONTROL MONITORING

9.1.1 Part by Part Control

9.1.1.1 Visual Inspection

Visual inspection of aluminum alloy parts before and after polishing must be performed on each part and meet the requirements of Section 10.1.

9.1.1.2 Reflectivity of Type II Finish (Reflective/Bright Finish)

Once polishing is completed and the polishing residues have been removed, the reflectivity of Type II polished surfaces must be evaluated as follows and meet the requirements of Section 10.2:

- Tag shown in Figure 1 must be positioned 12 inches away from a curved part, or 24 inches away from a flat part.
- The tag must be parallel to the polished surface as if it were a mirror.
- This test must take place under average lighting conditions.

NOTES: (1) Text must be Helvetica, Bold, 24 point.

(2) Letters must be black, on a white background.

FIGURE 1 : LABEL FOR REFLECTIVITY TEST (TYPE II FINISH)

9.1.1.3 Surface Roughness

Surface roughness must be measured per BATS 3211 or compared to a standard validated per BATS 3211 and meet the requirements of Section 10.3.

9.1.1.4 Exposed Core Material

When sanding per Section 7.1.1 is used as an operation before polishing clad parts, random areas on the polished parts must be inspected per BATS 5078 to ensure the cladding has not been removed and that the core is not exposed. Typically, on curved surfaces, the apex is more susceptible to material removal. Test results must meet the requirements of Section 10.4.

10 ACCEPTANCE CRITERIA

10.1 VISUAL INSPECTION

The polished surface must uniformly polished and must be free of detrimental defects. Surfaces must be free of scratches, nicks, burrs and gouges.

If defects are found, they must be identified and noted by their location on a sketch of the part and submitted for MRB evaluation.

Type I finish surfaces must be uniformly matt to semi-matt in appearance when viewed at a distance of 72 inches under average lighting conditions.

10.2 REFLECTIVITY

The reflectivity of the polished surface is acceptable when the definition of the reflected image of the tag shown in Figure 1 allows the operator to read the words off the part.

10.3 SURFACE ROUGHNESS

Surface roughness requirements for Type I Finish and Type II Finish, if any specified, must meet the Engineering Drawing requirements.

10.4 EXPOSED CORE MATERIAL (CLAD REMOVAL)

Parts must be submitted to MRB if the test reveals any exposed core material.

11 PERSONNEL CERTIFICATION/QUALIFICATION

Refer to BAEPM-001.

12 QUALIFICATION TEST REQUIREMENTS

No process qualification testing is required for Bombardier sites and subcontractor facilities that will perform processing in accordance with the procedures shown in this specification.